

Electronic nose 'smells'
organoleptic properties of packaging

A powerful tool

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Initially, packaging was only used to contain and protect the products from outside contamination. As the regulations on Volatile Organic Compounds (VOC) release has become more stringent, the food industry must control the organoleptic impacts or interactions between product and packaging. The electronic nose can be a device to do so.

The food industry must control the organoleptic impacts or interactions between product and packaging.



Nowadays electronic noses [abbreviated into e-noses, ed.], already in use in numerous companies, represent a simple, fast and reliable solution to control various types of polymers or paper packaging and their impact on the organoleptic properties of the food or beverage over time.

An e-nose consists of the following parts: an automatic sampling system that reproducibly introduces the sample, an array of sensors, an electronic data acquisition and pattern recognition software (in order to process the sensor response information) which is based on powerful multivariate algorithms.

VOC-analysis in correlation with Robinson-test

The Robinson Test, proposed by the International Chocolate and Cocoa Office in 1964 and modified in 1998, is a sensory test in which the taste of a food sample (chocolate is generally used as the standard) stored together with a printed packaging sample is assessed and compared with a reference food sample (pure chocolate). As chocolate is a fatty product, it easily traps VOC from printed or unprinted packaging materials.

That is why the Robinson test is now widely used in the flexible packaging industry to assess the organoleptic impact of the packaging materials on foodstuffs. However, this test is expensive, time consuming and the results can be subjective since it is performed by a human sensory panel. Therefore, there is a need for an objective tool that can rapidly provide results that provide a correlation with the sensory panel results.

Setting the analysis method

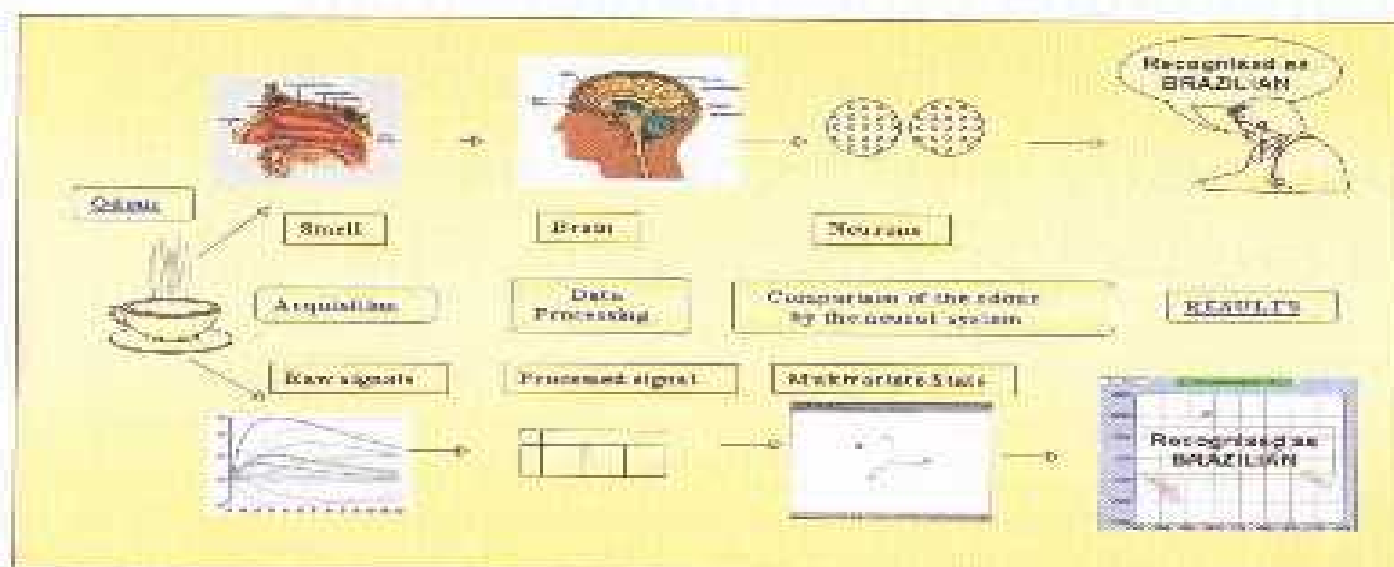
A set of multi-layer flexible packaging samples representative of various Robinson intensity scores from 1 to 4 were analysed with the Gemini E-nose. Five samples of each score were analysed under the analytical conditions (see table).

Photography: Reed Business Information

Analytical conditions

Carrier Gas	synthetic air
Flow Rate	150 ml/min
Acquisition Time	60 seconds
Headspace Temperature	65° Celsius
Generation Time	5 minutes
Samples Throughput	One every 5 minutes
Quantity Injected	2500 micro L
Quantity	5 cm by 10 cm rolled in the vial

To validate the model, several samples representative of the different organoleptic intensities were analysed in a predictive mode. The level of recognition was 100 per cent. Once validated, the model was used as a Statistical Quality Control reference to assess the packaging quality.



Complete history

The e-nose is a powerful tool at every step of the process. It can also detect and quantify residual solvents in flexible single or multi-layer packaging, LDPE films, aluminium foils, by initial correlation with GC or sensory panel data. In addition it can detect off-odours in hard packaging such as HDPE caps, caps liners, cap closures in paper (recycled or not) and printed and unprinted cartons.

The e-nose records a complete history of the quality of delivery per supplier, type of raw materials and finished products and may be used to monitor the batch to batch consistency, providing quantitative and qualitative measurements. Safety is also improved when assessing the Quality Control of solvents or other irritant chemicals (printing inks, resins etc.) as the sensory panel need not be exposed to a large number of samples.

E-noses are particularly suitable for carrying out rapid and objective control of packaging, especially within a QC/QA environment, which is increasingly important in the food and beverage industries. In summary they can improve results, save time and money and make for a safer environment. ■

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